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IN THE

Supreme Court of the United States

NORFOLK & WESTERN RAILWAY COMPANY,
Petitioner,

v.

FREEMAN AYERS, *et al.*,
Respondents.

On Writ of Certiorari to the Circuit Court of Kanawha County, West Virginia

BRIEF *AMICUS CURIAE* OF THE AMERICAN PUBLIC HEALTH ASSOCIATION IN SUPPORT OF RESPONDENTS

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INTEREST OF THE AMICUS CURIAE

Amicus Curiae American Public Health Association (APHA), founded in 1872, is the oldest and largest public health organization in the world, representing over 50,000 public health professionals. It represents over 50 occupations from all disciplines and specialties in public health. Since 1911, APHA has published the *American Journal of Public Health,* dedicated to original work in research, research methods, and program evaluation in the field of public health. APHA strives to improve public health by proposing solutions based on research, helping to set public health practice standards, and working closely with national and international health agencies.

Because APHA is devoted to the promotion and protection of personal, occupational and environmental health, it is directly concerned with issues of public and occupational health, including the health effects of asbestos exposure. APHA is committed to the dissemination of accurate scientific and medical data for use in developing health-related public policy, and APHA submits this brief in order to assist this Court in performing its function with a balanced and accurate understanding of available information concerning asbestos-related disease.[1]

SUMMARY OF ARGUMENT

In addressing the issue whether damages for fear of cancer should be available to plaintiffs who prove that they suffer from

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[1]The parties have consented to the filing of this brief, and their letters of consent have been filed with the Clerk. This brief was not authored in whole or in part by counsel for a party, and no person or entity other than the amicus, its members, or its counsel made a monetary contribution to the preparation or submission of the brief.

asbestosis, petitioner and its amici make numerous characterizations about the nature and significance of asbestosis and what is known about the relationship between asbestosis, lung cancer and smoking. For the most part, these characterizations do not reflect accepted scientific or medical knowledge. Because the judgment below should not be reversed based on a misunderstanding of the medical facts involved, Amicus Curiae APHA offers this brief to provide the Court with information about the medical and scientific evidence concerning asbestosis and cancer, which may help to inform the Court's determination. Despite the suggestions of petitioner and its amici, these facts are not controversial assertions with scant support. They represent a substantial body of data demonstrating that asbestosis is a severe and debilitating disease and that those who suffer from it experience a substantially increased risk of developing cancers likewise caused by their exposure to asbestos.

Underlying much of the argument of petitioner and its amici is the suggestion that asbestosis is a pretextual injury. In fact, asbestosis is a clinically significant, potentially disabling, progressive fibrosis of the lungs. Characterized by the gradual onset of dyspnea (or shortness of breath), its symptoms may also include chest pain, weight loss, coughing, and fatigue. Asbestosis can compromise the immune and cardiovascular systems as well as the respiratory system and will sometimes result in death.

Petitioner and its amici also argue that the elevated risk of asbestos-related cancer is too speculative, controversial and uncertain to support damages. But it is virtually beyond dispute that exposure to asbestos at levels sufficient to cause asbestosis also causes significant increased risks of lung cancer, pleural and peritoneal mesothelioma, and other cancers. Indeed, there is general agreement that the risk of asbestos-related lung cancer is greatest in persons diagnosed with asbestosis.

Petitioner and its amici further suggest that any increased

risk of cancer among asbestosis patients is primarily related to smoking rather than asbestos exposure. While tobacco smoking in the absence of asbestos exposure increases the risk of lung cancer as much as tenfold, an asbestos-exposed smoker faces fifty to sixty times the risk experienced by a non-smoker who was never exposed to asbestos, and a substantially greater risk than a smoker without asbestos exposure. Tobacco smoke and asbestos exposure have a synergistic effect, multiplying the risk of lung cancer, so that asbestos exposure significantly contributes to and increases the risk of lung cancer among smokers.

Finally, petitioner and its amici assert that fear of cancer among asbestosis patients is the result of information they have received from their doctors, and is thus somehow unreasonable or not genuinely attributable to their injurious exposure to asbestos. Management of asbestosis relies largely on patient education. Through such education, doctors can urge patients to avoid infection and stop smoking, which will decrease mortality from nonmalignant respiratory illness and the risk of lung cancer. Patients necessarily rely on their doctors for this type of information, and the apprehension of cancer that is the natural consequence of the provision of accurate information by doctors to patients cannot be disparaged as unreasonable or artificially induced.

ARGUMENT

I. ASBESTOSIS IS A CLINICALLY SERIOUS, OFTEN DISABLING, AND PROGRESSIVE SCARRING OF THE LUNGS.

Petitioner and its amici dismiss the significance of asbestosis as a significant physical injury, even calling it a pretextual injury. On the contrary, there is wide medical and scientific recognition that asbestosis is a clinically serious, often

disabling, and progressive disease.[2] Federal governmental research and regulatory agencies as well as major public health organizations such as the American Lung Association have consistently recognized that asbestosis is a disease of genuine severity.[3] Indeed, it is irreversible, progressive, and potentially

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[2]*See, e.g.*, Samuel P. Hammar & Ronald F. Dodson, *Asbestos, in* PULMONARY PATHOLOGY 901, 941 (David H. Dail & Samuel P. Hammar eds., 2d ed. 1994); SATTAR FARZAN, A CONCISE HANDBOOK OF RESPIRATORY DISEASES 208 (3d ed. 1992); MARVIN I. SCHWARTZ & TALMADGE E. KING, JR., INTERSTITIAL LUNG DISEASE 88 (1988); W. KEITH C. MORGAN & ANTHONY SEATON, OCCUPATIONAL LUNG DISEASES 333 (2d ed. 1984); ENCYCLOPAEDIA OF OCCUPATIONAL HEALTH AND SAFETY 188 (Luigi Parmeggiani ed., 3d ed. 1983); H. CORWIN HINSHAW & JOHN F. MURRAY, DISEASES OF THE CHEST 728 (4th ed. 1980); Leslie Michaels & Seymour S. Chissick, *Introduction, in* 1 ASBESTOS: PROPERTIES, APPLICATIONS AND HAZARDS 1, 9 (L. Michaels & S.S. Chissick eds., 1979).

[3]NATIONAL CANCER INSTITUTE, CANCER FACTS, ASBESTOS EXPOSURE: QUESTIONS & ANSWERS, http://cis.nci.nih.gov/fact/3_21.htm (asbestosis is "a chronic lung ailment that can produce shortness of breath, coughing, and permanent lung damage"); AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, CAS# 1332-21-4, PUBLIC HEALTH STATEMENT FOR ASBESTOS (2001), http://www.atsdr.cdc.gov/toxprofiles/phs61.html (asbestosis is "a serious disease and can eventually lead to disability and death"); U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, DHHS FACT SHEET: ASBESTOS (2001), http://www.hhs.gov/news/press/2001pres/20010916a.html (asbestosis "is a serious, progressive disease associated with long-term exposure to asbestos that causes damage (called 'scarring') to lung tissue"); U.S. ENVIRONMENTAL PROTECTION AGENCY, TECHNOLOGY TRANSFER NETWORK, AIR TOXICS WEBSITE, ASBESTOS 133-21-4, HAZARD SUMMARY, http://www.epa.gov/ttnatw01/hlthef/asbestos.html ("Asbestosis is characterized by shortness of breath and cough and may lead to severe impairment of respiratory function."); DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION, SUMMARY AND EXPLANATION OF REVISED STANDARDS, 59 FR 40964, 40979 (1994) (asbestosis is a "disabling and often fatal fibrosis of the deep portions of the lung"); AMERICAN LUNG ASSOCIATION, FACT SHEET: OCCUPATIONAL LUNG DISEASE (2000), http://www.lungusa.org/diseases/occupational_factsheet.html ("Asbestosis

deadly.[4]

The essential feature of asbestosis as a disease is fibrosis or scarring of lung tissue by inhaled asbestos fibers.[5] Beginning insidiously, the pathological changes caused by asbestos exposure cannot be corrected[6] and generally continue to worsen as time passes: "asbestosis is an inexorably progressive disease in most cases once it has started."[7] Asbestos fibers, once

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is a progressive disease involving scarring of lung tissue as a result of exposure to the microscopic fibers of asbestos."). *See also* CANADIAN LUNG ASSOCIATION, ASBESTOSIS/DUST DISEASES (2002), http://www.lung.ca/diseases/asbestosis.html ("After the fibrosis becomes well established the worker develops increasing breathlessness often with cough, sputum and weight-loss.")

[4]Raymond Demers, Agency for Toxic Substances & Disease Registry, *Asbestos Toxicity, in* CASE STUDIES IN ENVIRONMENTAL MEDICINE 15 (Irving Selikoff ed., 1990).

[5]GORDON L. SNIDER, CLINICAL PULMONARY MEDICINE 289-90 (1981) ("Asbestosis is a form of chronic interstitial fibrosis produced by asbestos. ... Progression appears to be relentless, even after exposure has ceased."); Richard P. Stankus et al., *Hypersensitivity Lung Disease, in* 3 CURRENT PULMONOLOGY 61, 76 (Daniel H. Simmons ed., 1981) ("Asbestosis is a chronic, fibrosing, inorganic-dust pneumoconiosis. ... [which] may progress after cessation of exposure."); Roger Williams & P. Hugh-Jones, *The Significance of Lung Function Changes in Asbestosis,* THORAX 15:109-19, 109 (1960) (asbestosis is "a crippling form of pulmonary fibrosis").

[6]J. Bernard L. Gee & G.J. Walker Smith, *Cellular Mechanisms in Occupational Lung Disease, in* OCCUPATIONAL LUNG DISEASE 39, 51 (J. Bernard L. Gee et al. ed., Am. Coll. Chest Physicians 1984) ("Clinically, established lung fibrosis is irreversible.").

[7]G.K. Sluis-Cremer & Eva Hnizdo, *Progression of Irregular Opacities in Asbestos Miners,* BR. J. IND. MED. 46:846-52, 851 & 852 (1989) ("Our results indicate that once a dose of asbestos sufficient to initiate the disease has been retained in the lungs the disease is inexorably progressive."); Robert Barnes, *Progression of Radiographic Changes in*

inhaled, are drawn into the lung parenchyma and can remain embedded there for many years.[8] As asbestosis progresses, the lungs will shrink in volume, become increasingly firm and develop areas of cysts called honeycombing.[9] "With

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Asbestos Workers and Ex-Workers, J. SOC. OCCUP. MED. 36:9-12, 11 (1986) (documenting progression years after leaving employment and associated disability); Council on Scientific Affairs, *A Physician's Guide to Asbestos-Related Diseases*, J.A.M.A. 252:2593-97, 2594 & 2595 (1984); Suzanne A.H. James, *Asbestosis*, RADIOLOGY 37:81-85, 82 (1966) (asbestosis "is generally progressive even after removal from contact").

[8]Daniel E. Banks, *Asbestos-Related Diseases of the Lung*, WEST VIRGINIA MED. J. 76:163-68, 164 (1980); *Pneumoconiosis, in* SURGICAL PATHOLOGY OF NON-NEOPLASMIC LUNG DISEASE 85 (James L. Bennington ed., 13th ed. 1982) ("Interstitial fibrosis can progress even after exposure has ceased, a phenomenon related at least in part to the persistence of asbestos fibers in the lungs."); Irving J. Selikoff et al., *Asbestosis and Neoplasia*, AM. J. MED. 42(4):487-96, 488 (1967) ("The asbestos fibers remain *in situ* where inhaled, but the tissue response to them is indolent, albeit progressive and apparently irreversible.").

[9]Hammar & Dodson (1994), *supra*, at 941 ("As the fibrosis becomes more severe, there are streaks and foci of greyish-white fibrous tissue in the [lung tissue]... and honeycombing may occur."); ENCYCLOPAEDIA OF OCCUPATIONAL HEALTH AND SAFETY, *supra*, at 188 ("areas [of fibrosis] increase in size and coalesce causing diffuse interstitial fibrosis with shrinkage. The process starts in the bases spreading upward as the disease progresses; in advanced disease the whole lung structure is distorted and replaced by dense fibrosis, cysts, and some areas of emphysema."); John M. Dement et al., *Asbestosis, in* OCCUPATIONAL RESPIRATORY DISEASES 287, 307 & 317 (James A. Merchant ed., Dep't of Health & Human Serv. (NIOSH) Pub. 1986). *See also* Banks (1980), *supra*, at 165 (advanced cases may show "a diffusely fibrotic, shrunken lung"); *Pneumoconiosis* (1982), *supra*, at 87; J.S.P. Jones, *Asbestos-Related Diseases, Part 2: Pathology and Experimental Pathology of Asbestos Dust Exposure, in* 1 ASBESTOS: PROPERTIES, APPLICATIONS AND HAZARDS 409, 418 (L. Michaels & S.S. Chissick eds., 1979) ("when the severity of the disease is slight, the lungs will be of normal size, but the greater the amount of fibrosis, the greater will be the degree of lung shrinkage.").

progressive asbestosis, airspaces are obliterated."[10] Because the progressive fibrosis decreases the elasticity of the lungs, the patient is likely to experience a feeling of tightness in the chest.[11] The decreased lung volume will provoke a pattern of rapid, shallow breathing.[12] Eventually, the patient may suffer arterial oxygen desaturation and cyanosis.[13]

The most prominent symptom of asbestosis is dyspnea or shortness of breath. Dyspnea appears first on exertion and becomes increasingly severe over time, progressing to serious dyspnea when the patient is at rest.[14] Studies have shown that

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[10]Jerome Kleinerman, *Occupational Lung Diseases: Asbestos-, Talc-, and Beryllium-Related Respiratory Diseases, in* BAUM'S TEXTBOOK OF PULMONARY DISEASE 769, 772 (1994). *See also* John E. Craighead et al., *The Pathology of Asbestos-Associated Diseases of the Lungs and Pleural Cavities: Diagnostic Criteria and Proposed Grading Schema*, ARCH. PATHOL. LAB. MED. 106:544-96, 570 (1982).

[11]Demers (1990), *supra*, at 11.

[12]Craighead et al. (1982), *supra*, at 575.

[13]Dement et al. (1986), *supra*, at 317; Craighead et al. (1982), *supra*, at 570 ("Hypoxemia develops when significant ventilation-perfusion discrepancies develop and gas exchange fails. Occasionally it is clinically manifested as cyanosis, initially on exercise, and in the later stages at rest.").

[14]Schwartz & King (1988), *supra*, at 88 ("Dyspnea [shortness of breath] becomes more severe and progressively less exertion is tolerated as the disease proceeds. ... Dyspnea at rest, edema associated with cor pulmonale, and ultimately respiratory failure may appear in the final stages of severe asbestosis."); George M. Lordi & Lee B. Reichman, *Pulmonary Complications of Asbestos Exposure*, AM. FAMILY PHYSICIAN 48(8):1471-77, 1474 (1993); Demers (1990), *supra*, at 11; Dement et al. (1986), *supra*, at 287 & 315; PULMONARY MEDICINE 641 (Clarence A. Guenter ed., 2d ed. 1982); Craighead et al. (1982), *supra*, at 575; Matti S. Huuskonen, *Clinical Features, Mortality & Survival of Patients with Asbestosis*, SCAND. J. WORK ENVIRON. & HEALTH 4:265-74, 269-70 & 272 (1978); Kleinerman (1994), *supra*, at 774.

the prevalence of dyspnea among patients with asbestosis is not associated with smoking history or habits.[15]

Assessment of dyspnea is a helpful tool for identifying patients with a worse prognosis.[16] It may appear even before lung abnormalities are detected radiographically.[17] Indeed, although radiographic evidence is a central criterion for diagnosing asbestosis, it underestimates the degree of interstitial fibrosis: "the chest x-ray can be normal even in the face of severe interstitial fibrosis."[18] Dyspnea is more prevalent, however, among those with radiographic abnormalities.[19]

As a result of the pulmonary damage caused by asbestosis, the patient may suffer additional symptoms including chest pain, fatigue, weight loss or anorexia, clubbing of the fingers,

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[15]Dement et al. (1986), *supra,* at 305.

[16]David A. Schwartz et al., *Longitudinal Changes in Lung Function Among Asbestos-Exposed Workers,* AM. J. RESPIR. CRIT. CARE MED. 150:1243-49, 1248 (1994).

[17]Dement et al. (1986), *supra,* at 315. *See also* Huuskonen (1978), *supra,* at 265 (breathlessness is often "out of proportion to the physical pulmonary signs and radiographic appearances common for asbestosis").

[18]Steven B. Markowitz et al., *Clinical Predictors of Mortality from Asbestosis in the North American Insulator Cohort, 1981 to 1991,* AM. J. RESPIR. CRIT. CARE MED. 156:101-108, 106 (1997) (citing study by Liddell and McDonald (1980) in which some subjects with negative x-rays died of asbestosis and study by Kipen et al. (1987) in which 23 of 25 subjects with negative x-rays showed moderate to severe fibrosis on histology); Irving J. Selikoff & Ruth Lilis, *Radiological Abnormalities Among Sheet-Metal Workers in the Construction Industry in the United States and Canada: Relationship to Asbestos Exposure,* ARCH. ENVIRON. HEALTH 46(1):30-36, 35 (1991); Bertram Mann, *Asbestosis,* RADIOGRAPHY 46:250-52, 251 (1980).

[19]Selikoff & Lilis (1991), *supra,* at 33 & 35.

and coughing.[20] The chest pain associated with asbestosis has been described as "either sharp and lacerating or aching in character," appearing spontaneously in the chest, back or abdomen and lasting for minutes or hours at a time.[21] Asbestosis also can cause pleural effusions, fluid buildup around the lungs that further restricts the patient's breathing.[22] In the final stages, the patient may suffer respiratory failure.[23]

In addition to its respiratory effects, asbestosis can impair cardiovascular function. Pulmonary fibrosis can increase resistance to blood flow through the capillary bed.[24] The increased resistance results from "thickening in the pulmonary small arteries and arterioles caused by muscular hypertrophy and subintimal fibrosis."[25] Even before the patient suffers clinically detectable decreases in respiratory function, he may develop pulmonary hypertension and "cor pulmonale," a potentially fatal complication that can lead to congestive heart

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[20]Lordi & Reichman (1993), *supra,* at 1474; Demers (1990), *supra,* at 11; Henry P. Pendergrass, *Diseases Related to Asbestos Exposure: Historical Perspective,* SOUTHERN MED. J. 80(12):1546-52, 1549 (1987); Dement et al. (1986), *supra,* at 315 (discussing cough, bronchitis and airway obstruction); PULMONARY MEDICINE, *supra,* at 641; Mann (1980), *supra,* at 251.

[21]Mann (1980), *supra,* at 251.

[22]Kleinerman (1994), *supra,* at 772 & 774; PULMONARY MEDICINE, *supra,* at 641; Craighead et al. (1982), *supra,* at 575.

[23]PULMONARY MEDICINE, *supra,* at 641.

[24]Demers (1990), *supra,* at 10; PULMONARY MEDICINE, *supra,* at 641.

[25]Kleinerman (1994), *supra,* at 772-73.

failure.[26] Studies consistently find increased mortality from cardiovascular disease among asbestos workers due to the increased stress on the cardio-pulmonary system.[27]

Asbestosis has also been connected to depressed immune function.[28] As fibrosis develops, the lung tissue becomes thickened and filled with immune cells — mononuclear cells, neutrophils, and macrophages.[29] The patient will be susceptible to pulmonary infections that are often fatal to those with advanced asbestosis.[30]

Asbestosis itself is thus a potentially deadly disease. Studies have shown that asbestosis patients have a statistically significant increased mortality from nonmalignant respiratory diseases, most frequently from asbestosis but also from the

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[26]Demers (1990), *supra*, at 10. *See also* Morgan & Seaton (1984), *supra*, at 333 (shortness of breath from asbestosis "progresses even when the patient is removed from contact with asbestos, usually resulting in the development of cor pulmonale and death within 15 years of the onset of the disease"); Huuskonen (1978), *supra*, at 265 (in 46 percent of patients whose underlying cause of death was asbestosis, the immediate cause of death was cor pulmonale).

[27]John M. Dement et al., *Exposure and Mortality Among Chrysotile Asbestos Workers, Part II: Mortality*, AM. J. IND. MED. 4:421-33, 425 (1983).

[28]Demers (1990), *supra*, at 10; Council on Scientific Affairs (1984), *supra*, at 2594; N. James Doll et al., *Immunopathogenesis of Asbestosis, Silicosis, & Coal Workers' Pneumoconiosis*, CLINICS CHEST MED. 4(1):3-14, 4-6 (1983); Craighead et al. (1982), *supra*, at 590.

[29]Banks (1980), *supra*, at 165. *See also* M. Turner Warwick et al., *Immunology and Asbestosis, in* BIOLOGICAL EFFECTS OF ASBESTOS (IARC SCIENTIFIC PUBLICATIONS No. 8) 258-63 (Int'l Agency for Research on Cancer, World Health Org. 1973) (finding elevated levels of antinuclear antibody and rheumatoid factor in asbestos-exposed workers).

[30]Demers (1990), *supra*, at 15.

increased infections that are connected to the disease.[31] Statistics may understate the mortality rate because asbestosis frequently goes unrecognized as a cause of death.[32] In one study of Finnish workers with asbestosis, 41.9 percent of the deceased patients died of asbestosis.[33] And contrary to the suggestion that serious cases of asbestosis are becoming a thing of the past, another recent study found greater mortality from asbestosis in the 1980s and 1990s than in the 1960s and '70s among a cohort of 17,800 insulation workers.[34] The risk of mortality is significantly greater with more advanced radiographic findings and/or clinical symptoms of asbestosis, like dyspnea.[35]

The first published account of death from asbestosis was in the 1920s; the patient's doctor identified her illness as "asbestos poisoning."[36] Her cause of death was certified, however, as "fibrosis of the lungs due to the inhalation of mineral particles [asbestos]."[37] Thousands more asbestos workers have died since then. There can be no doubt that asbestosis is a clinically serious pulmonary disease.

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[31]*See* Dement et al. (1986), *supra*, at 290-96 (summarizing motality studies in asbestos-exposed populations). *See also, e.g.*, Dement et al. (1983), *supra*, at 428.

[32]Markowitz et al. (1997), *supra*, at 107.

[33]Huuskonen (1978), *supra*, at 271.

[34]Markowitz et al. (1997), *supra*, at 104-105.

[35]*Id.* at 106.

[36]Irving J. Selikoff & Morris Greenberg, *A Landmark Case in Asbestosis*, J.A.M.A. 265(7):898-901, 898 (1991).

[37]*Id.* at 900.

II. THE OCCURRENCE OF ASBESTOSIS RELIABLY SIGNALS AN INCREASED RISK OF CANCER.

Petitioner contends that a diagnosis of asbestosis is irrelevant to any asbestos-related increased risk of cancer and that an increased risk is actually speculative, controversial and uncertain. To the contrary, there is general scientific consensus that exposure to asbestos at levels sufficient to cause asbestosis also causes significant increased risks of various cancers, most notably lung cancer and mesothelioma.[38] Specialist Victor Roggli has written that "the association of lung cancer with asbestosis is truly astounding, with somewhere between 40 percent and 65 percent of individuals with asbestosis ultimately succumbing to carcinoma of the lung."[39] Other sources cite similar figures: "When clinical asbestosis is present, the incidence of lung cancer is extremely high, averaging about 30 percent of deaths and ranging as high as 50 percent of deaths in published series."[40]

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[38]*See generally, e.g.*, Victor L. Roggli, *Human Disease Consequences of Fiber Exposures: A Review of Human Lung Pathology and Fiber Burden Data*, ENV. HEALTH PERSP. 33:295-303, 299 (1990) ("The association between asbestos exposure and lung cancer is widely accepted for patients with asbestosis."); James A. Talcott & Karen H. Antman, *Asbestos-Related Malignancy*, CURR. PROBL. CANCER 12(3): 133-79 (1988); RICHARD DOLL & JULIAN PETO, ASBESTOS: EFFECTS ON HEALTH OF EXPOSURE TO ASBESTOS 2 (1985) ("It is now universally agreed that exposure of men and women to asbestos fibres can, under certain circumstances, lead to three diseases: asbestosis, lung cancer, and mesothelioma."); W.R. Parkes, *Silicates and Lung Disease*, *in* OCCUPATIONAL LUNG DISORDERS 233-96 (2d ed. 1982).

[39]Roggli (1990), *supra*, at 301.

[40]Andrew Churg, *Asbestos, Asbestosis and Lung Cancer*, MODERN PATHOL. 6(5):509-511, 510 (1993); *see also* Snider (1981), *supra*, at 293 ("As many as 50 percent of patients with asbestosis have been reported to

Studies of populations of exposed workers and asbestosis patients have repeatedly shown that those suffering clinically diagnosable asbestosis have highly elevated risks of lung cancer as compared both to the general population and to people exposed to asbestos but not suffering from asbestosis. For example, an autopsy study of deceased asbestos miners indicated that those with "slight asbestosis" faced odds of lung cancer roughly 5-8 times greater than those with no asbestosis and those with "moderate/pronounced" asbestosis faced odds of cancer 5-10 times greater than those without asbestosis.[41] Other studies have followed asbestos-exposed workers and examined their risk of dying of lung cancer compared with expected rates in the surrounding community, expressed as a "standardized mortality ratio" (SMR), which is the observed number of lung cancer deaths divided by the expected number of such deaths multiplied by 100. In a number of studies, SMRs were substantially elevated in those with asbestosis, ranging from 237 to 636, and were always higher than in those without asbestosis.[42] Some studies also have sought to determine the fraction of patients with asbestosis who ultimately develop lung cancer. In one such study, 11.7% of those with asbestosis

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die of bronchogenic carcinoma.").

[41]G.K. Sluis-Cremer & B.N. Bezuidenhout, *Relation Between Asbestosis and Bronchial Cancer in Amphibole Asbestos Miners*, BR. J. IND. MED. 46:537-40 (1989).

[42]Janet M. Hughes & Hans Weill, *Asbestosis as a Precursor of Asbestos Related Lung Cancer*, BR. J. INDUS. MED. 48:229 (1991) (SMR of 433); D.E. Fletcher, *A Mortality Study of Shipyard Workers with Pleural Plaques*, BR. J. IND. MED. 29:142-5 (1972) (SMR of 237); F.D.K. Liddell & J.C. McDonald, *Radiological Findings as Predictors of Mortality in Quebec Asbestos Workers*, BR. J. INDUS. MED. 37:257-67 (1980) (SMR of 350); W.O.C. Cookson et al., *Compensation, Radiographic Changes and Survival in Applicants for Asbestosis Compensation*, BR. J. INDUS. MED. 42:461-68 (1985) (SMR of 636).

developed lung cancer after approximately 23.4 years of employment and 35.5 years of follow-up.[43] Another study of 155 men diagnosed with asbestosis between 1968 and 1974 revealed 59 deaths on follow-up: 39% from lung cancer, 10% from mesothelioma.[44]

It is generally agreed that asbestos is a carcinogen.[45] But while evidence exists that asbestos-related lung cancer may develop in the absence of asbestosis,[46] the association between asbestosis and lung cancer is so strong that some researchers (and, frequently, defendants in asbestos litigation) argue that a diagnosis of lung cancer cannot reliably be linked to asbestos

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[43]Hughes & Weill (1991), *supra*. Additional follow-up would be expected to show additional lung cancers, as more patients would develop cancer as the latency period progresses.

[44]I.I. Coutts & M. Turner-Warwick, *Factors Predicting Outcome in Intrapulmonary Fibrosis Associated with Asbestos Exposure (Asbestosis)*, *in* OCCUPATIONAL LUNG DISEASE 208 (J. Bernard L. Gee et al. ed., Am. Coll. Chest Physicians 1984).

[45]For example, the Department of Health and Human Services (DHHS), the Environmental Protection Agency (EPA), and the International Agency for Research on Cancer (IARC) agree that asbestos is a human carcinogen. AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, CAS# 1332-21-4, PUBLIC HEALTH STATEMENT FOR ASBESTOS (2001), http://www.atsdr.cdc.gov/toxprofiles/phs61.html; U.S. ENVIRONMENTAL PROTECTION AGENCY, TECHNOLOGY TRANSFER NETWORK, AIR TOXICS WEBSITE, ASBESTOS 133-21-4 http://www.epa.gov/ttnatw01/hlthef/asbestos.html.

[46]Gunnar Hillerdal, *Pleural Plaques and Risk for Bronchial Carcinoma and Mesothelioma*, CHEST 105:144-50 (1994); Liddell & McDonald (1980), *supra*; K.M. Martischnig et al., *Unexpected Exposure to Asbestos and Bronchogenic Carcinoma*, BRIT. MED. J. 1:746-49 (1977). *See also* Douglas W. Henderson et al., *Asbestos-Related Lung Cancer: Is it Attributable to Asbestosis, or to Asbestos Fiber Burden?*, *in* PATHOLOGY OF LUNG TUMORS 83, 104 (B. Corrin ed., 1997) (noting this disagreement).

exposure absent asbestosis as a precursor.[47] The association between asbestosis and lung cancer holds true even where asbestosis does no appear on x-rays but is confirmed by pathologic examination of the lung tissue.[48] However, the relative risk of developing lung cancer appears to increase with the severity of pulmonary fibrosis due to asbestosis,[49] and tumors appear to form more often in areas of fibrosis.[50]

Although it is generally agreed that asbestosis signals a significantly increased risk of lung cancer *beyond* the risk associated with asbestos exposure alone, the nature of the association is still in dispute.[51] Some researchers have

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[47]*Compare, e.g.*, Philip T. Cagle, *Criteria for Attributing Lung Cancer to Asbestos Exposure*, AM. J. CLIN. PATH. 117:9-15 (2002) (arguing that attribution of lung cancer to asbestos exposure can be made only when asbestosis is present) *with* M.M. Finkelstein, *Radiographic Asbestosis Is Not a Prerequisite for Asbestos-Associated Lung Cancer in Ontario Asbestos-cement Workers*, AM. J. INDUS. MED. 32:341-48 (1997)(acknowledging association but arguing that asbestos-related lung cancer occurs even in non-asbestotics).

[48]Paul Wilkinson et al., *Is Lung Cancer Associated with Asbestos Exposure When There Are No Small Opacities on the Chest Radiograph?*, LANCET 345:1074-78 (1995); Sluis-Cremer & Bezuidenhout (1989), *supra*; H.M. Kipen et al., *Pulmonary Fibrosis in Asbestos Insulation Workers with Lung Cancer: a Radiological and Histopathological Evaluation*, BR. J. INDUS. MED. 44:96-100 (1987).

[49] *See, e.g.*, Henderson et al. (1997), *supra*, at 83.

[50]Churg (1993), *supra*, at 510; Parkes (1982), *supra*, at 270; Doll & Peto (1985), *supra*, at 2 ("As a rule, the tumor arises in the vicinity of the fibrosis and, therefore, occurs chiefly in the lower parts of the lungs — usually the lower lobes."). *See also* Roggli (1990), *supra*, at 299 (because fibrosis is generally concentrated in the lower lobes, "there is an increased predominance of lower lobe cancers among asbestos workers in contrast to the upper lobe predominance among nonexposed cigarette smokers").

[51] *See, e.g.*, Henderson et al. (1997), *supra*, at 104.

theorized that immunologic deficits caused by asbestosis may weaken the body's ability to destroy potentially malignant cells.[52] Others believe that the fibrosis itself creates the increased risk.[53] And others contend that the increased fiber burden that typically accompanies (and causes) asbestosis also causes the increased risk of cancer.[54] Whatever the mechanisms involved, the association between asbestosis and lung cancer cannot be ignored.

The occurrence of asbestosis tangibly and objectively demonstrates that a person faces a significant increased risk of cancer beyond that of the general population. Reports associating lung cancer with asbestosis first appeared in 1935.[55] Since then, study after study has confirmed the strong association between the two diseases.[56] Some scientists have gone so far as to opine that "detailed examination of both human and animal data reveal that it is not high exposure per se,

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[52]Parkes (1982), *supra*, at 271-72.

[53] *See, e.g.*, Henderson et al. (1997), *supra*, at 86.

[54]*Id.* at 86-87.

[55] K. M. Lynch & W.A. Smith, *Pulmonary Asbestosis III: Carcinoma of the Lung in Asbestos-Silicosis*, AM. J. CANCER, 24:56-64 (1935); S.R. Gloyne, *Two Cases of Squamous Carcinoma of the Lung Occurring in Asbestosis*, TUBERCLE 17:5-10 (1935-36).

[56]Hughes & Weill (1991), supra; Sluis-Cremer & Bezuidenhout (1989), *supra*; Kipen et al. (1987), *supra*; I.I. Coutts et al., *Mortality in Cases of Asbestosis Diagnosed by a Pneumoconiosis Medical Panel*, THORAX 42:111-16 (1987); Cookson et al. (1985), *supra*; Murial L. Newhouse et al., *Mortality of Factory Workers in East London 1933-80*, BR. J. INDUS. MED. 42:4 (1985); G. Berry, *Mortality of Workers Certified by Pneumoconiosis Medical Panels as Having Asbestosis*, BR. J. INDUS. MED. 38:130-37 (1981); Liddell & McDonald (1980), *supra*; Huuskonen (1978), *supra*; Richard Doll, *Mortality from Lung Cancer in Asbestos Workers*, BR. J. INDUS. MED. 12:81-86 (1955).

but the actual presence of asbestosis that is associated with an increased lung cancer risk."[57] The existence of a significant association between asbestosis and cancer is not a matter of substantial disagreement within the scientific community.

III. SMOKERS EXPOSED TO ASBESTOS FACE SUBSTANTIAL CANCER RISKS BEYOND THE RISKS ASSOCIATED WITH SMOKING ALONE.

Petitioner suggests that the risk of lung cancer caused by smoking renders insignificant any asbestos-related increased risk of cancer in people who smoke. But asbestos exposure in fact causes significantly increased risks of cancers that have no causal relationship to tobacco smoke, most notably pleural and peritoneal mesotheliomas — cancers that are generally fatal within a year of the onset of symptoms.[58] And even with respect to lung cancer, asbestos exposure is known to put cigarette smokers at a substantially increased risk over smokers not exposed to asbestos.

Tobacco smoking and asbestos exposure are widely understood to have a "synergistic" effect, multiplying and thus dramatically increasing the risk to people who experience both

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[57]Churg (1993), *supra*, at 509.

[58] *See, e.g.*, Marc M. Dunn, *Asbestos in the Lung*, CHEST 95(6):1304-308 (1989); Parkes (1982), *supra*, at 286 ("Cigarette smoking is not related to the development of this tumor [mesothelioma]."); Doll & Peto (1985), *supra*, at 3; Arthur L. Frank, *Asbestos as an Air Pollutant and Synergism with Smoking*, CANCER DET. & PREV. 9:337-41, 338 (1986) ("there is no apparent relationship to the development of mesothelioma among cigarette smokers"); Andrew M. Churg, *Diseases of the Pleura*, in PATHOLOGY OF THE LUNG 851 (W.M. Thurlbeck & A.M. Churg eds., 2d ed. 1995) (citing studies showing mean survival following onset of symptoms of mesothelioma to be 12.5 months and 7 months).

exposures.[59] While cigarette smoking in the absence of asbestos exposure increases the risk of lung cancer by approximately ten times as compared to non-smokers, an asbestos-exposed smoker faces *fifty to sixty times* the risk experienced by a never-exposed non-smoker.[60] In short, asbestos-exposed smokers have ample reason to fear cancers that have no connection to smoking whatsoever, and *far greater reason* to fear lung cancer than smokers who were never exposed to asbestos.

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[59]A. Churg & F.H.Y. Green, *Occupational Lung Disease,* in PATHOLOGY OF THE LUNG 851 (W.M. Thurlbeck & A.M. Churg eds., 2d ed. 1995); Hammar & Dodson (1994), *supra,* at 901; H. Vainio & P. Boffetta, *Mechanisms of the Combined Effect of Asbestos and Smoking in the Etiology of Lung Cancer,* SCAND. J. WORK ENVIRON. HEALTH 20:235-42 (1994); S. Donald Greenberg & Victor L. Roggli, *Carcinoma of the Lung, in* PATHOLOGY OF ASBESTOS-ASSOCIATED DISEASES 189-210 (V.L. Roggli et al. eds., 1992); Dunn (1989), *supra,* at 1306 ("asbestos exposure and smoking are synergistic in the promotion of bronchogenic carcinoma"); Frank E. Speizer, *Environmental Lung Disease*, in HARRISON'S PRINCIPLES OF INTERNAL MEDICINE 1068 (Eugene Braunwald, et al. eds., 11th ed. 1987); Parkes (1982), *supra,* at 271 ("The effects of smoking and asbestosis appear to be synergistic and multiplicative."); J.C. McDonald, *Asbestos-Related Disease: an Epidemiologic Review, in* BIOLOGICAL EFFECTS OF MINERAL FIBERS 587-602 (J.C. Wagner ed., 1980); Irving J. Selikoff & E. Cuyler Hammond, *Asbestos and Smoking*, J.A.M.A. 242: 458-59 (1979); R. Saracci, *Asbestos and Lung Cancer; an Analysis of the Epidemiological Evidence on the Asbestos-smoking Interaction,* INT. J. CANCER 20:323-31 (1977).

[60]Nicholas H. de Klerk et al., *Smoking, Exposure to Crocidolite, and the Incidence of Lung Cancer and Asbestosis*, BR. J. INDUS. MED. 48:412-17 (1991); G. Berry et al., *Combined Effect of Asbestos and Smoking on Mortality from Lung Cancer and Mesothelioma in Factory Workers*, BR. J. INDUS. MED. 42:12-38 (1985); J. Corbett McDonald & Alison D. McDonald, *Epidemiology of Asbestos-Related Lung Cancer, in* ASBESTOS-RELATED MALIGNANCY 57-79 (K. Antman & J. Aisner eds., 1985); E. Cuyler Hammond et al., *Asbestos Exposure, Cigarette Smoking, and Death Rates*, ANN. N.Y. ACAD. SCI. 330:473-91 (1979).

Although scientists agree that the combination of smoking and asbestos creates a grave risk of cancer, uncertainty remains about the mechanisms of the synergistic relationship. Whatever the mechanisms or causes of the synergistic relationship, however, its effect is to dramatically increase the risk of lung cancer among asbestos-exposed smokers over that experienced by non-exposed smokers.

IV. A DOCTOR'S ADVICE ABOUT FUTURE CANCER RISK IS A RELIABLE SOURCE OF INFORMATION AND A CRITICAL PART OF THE PATIENT'S MEDICAL CARE.

Finally, petitioner and its amici suggest that a patient's fear of cancer is somehow fabricated or unreasonable because it is based on information from the patient's doctor and is not an independent or "natural" fear.[61] It is a central part of the doctor's responsibility to advise patients on health issues, and patients reasonably rely on such advice every day. It seems remarkable then to suggest that, unless the patient is an epidemiologist with independent knowledge of his or her future risks, the patient's understanding based on medical advice about the consequences and risks associated with his illness must somehow be disregarded.

In addition, information from the physician about an asbestosis patient's future risk of cancer serves an important medical function. Because asbestosis is incurable and largely

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[61]Actually, many asbestos workers know of their increased risk of cancer long before they are diagnosed with asbestosis and informed of the risk by their doctor. *See* Allen H. Lebovits et al., *Chronic Occupational Exposure to Asbestos: More than Medical Effects,* J. OCC. MED. 30(1):49-54, 51 (1988) (finding that asbestos workers knew of increased risk an average of 18 years before participating in study).

untreatable,[62] management of the disease depends on patient education.[63] Behavioral changes can affect the future risk of cancer, and it will be particularly important for the doctor to discuss these issues with the patient.[64] For example, because of the synergistic effect between asbestos and smoking, "cessation of smoking is likely to confer an even greater avoidance of risk of lung cancer in people with a history of heavy asbestos exposure than in the population at large."[65] The doctor will also need to discuss with the patient the need for medical monitoring resulting from the increased risk of cancer.[66] Medical information and advice from a treating physician is both reasonably reliable and necessary to the patient's treatment.

As a result, asbestosis patients do have a relatively higher, and medically reasonable, concern about their risk of

[62]*See* Parkes (1982), *supra,* at 273 ("There is no treatment at present known which will arrest or retard the progress of asbestosis").

[63]Demers (1990), *supra,* at 15.

[64]Demers (1990), *supra,* at 15.

[65]Doll & Peto (1985), *supra,* at 3. *See also* AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, CAS# 1332-21-4, TOXFAQS FOR ASBESTOS (2001), http://www.atsdr.cdc.gov/tfacts61.html; Dement et al. (1986), *supra,* at 319 ("asbestos workers should be educated on the multiplicative risks of smoking and asbestos exposure"); Theodore L. McLemore et al., *Update on Asbestos-Associated Pulmonary Disease,* TEXAS MED. 77:38-46, 42 (1981) (emphasizing the role of the primary physician in alerting patients to their increased risk of cancer and advising cessation of smoking).

[66]Parkes (1982), *supra,* at 272 ("This risk of bronchial carcinoma complicating asbestosis must always be borne in mind especially in individuals who smoke and have had long exposure to asbestos. In order to identify the growth as early as possible it is advisable to examine workers with more than 10 years exposure to asbestos routinely at yearly intervals.").

contracting cancer.[67] "This health concern appear[s] to be firmly related to actual physical health status, such that deteriorating health [leads] to increasing somatic concern, increasing levels of mood state disturbance, and deteriorating mental health functioning."[68] Thus, when an asbestos worker has been diagnosed with asbestosis and begins to experience the symptoms associated with that disease, his or her actual fear of cancer is likely to increase for psychological as well as practical reasons. "The constant threat of cancer vulnerability exacts its psychological toll as well."[69] The fear of cancer has a significant impact on the patient's health and well-being, separate from the physical impact of asbestosis.

CONCLUSION

The medical literature cited and discussed in this brief demonstrates that the characterizations of petitioner and its amici regarding the nature of asbestosis and its relationship to cancer and to smoking are not representative of generally accepted views within the medical and scientific community. APHA urges the Court, in deciding the issues in this case, to recognize the substantial body of medical and scientific evidence that asbestosis is a genuine disease and that its diagnosis in a patient is associated with a substantial risk of asbestos-caused cancer.

[67]Lebovits et al. (1988), *supra,* at 52.

[68]*Id.*

[69]*Id.* at 54.

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